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ULTRA-LOW DIELECTRICS FILM FOR COPPER INTERCONNECT**BACKGROUND OF THE INVENTION****FIELD OF THE INVENTION**

5 The present invention relates to an ultra-low dielectric film for a copper interconnect, in particular, to an porous film prepared by coating with an organic solution containing a polyalkyl silsesquioxane precursor or its copolymer as a matrix and acetylcyclodextrin nanoparticles as a template and followed by performing a sol-gel reaction and heat treatment at higher temperature. The
10 present films may contain the template of up to 60 vol%, which is due to the selective use of acetylcyclodextrin, and have homogeneously distributed pores with the size of no more than 5 nm in the matrix. In addition, the present films exhibit an ultra low dielectric constant of about 1.5, and well-defined closed pores, so that thus being considered as a good ultra-low dielectric film for a copper
15 interconnect.

DESCRIPTION OF THE RELATED ART

20 Due to the recent request for semiconductors to have the properties of high integration and high speed, the critical dimension is on the drastic decrease. Low dielectrics, fabricated with aluminum liner and silicone oxide membrane (SiO_2 , $k=4.0$) and fluoro-silicone oxide membrane ($k=3.5$) as interlayer dielectrics, have been recognized as an excellent semiconductor device having high integration and high performance. However, such low dielectrics show serious shortcomings that signal delay due to delay of RC [expressed as multiplying a resistance (R) of a liner